

ANNUAL REPORT FOR 2003



Huskanaw Swamp Mitigation Site
Martin County
Project No. 6.099008T
TIP No. R-2111 WM



Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
December 2003

TABLE OF CONTENTS

SUMMARY.....	1
1.0 INTRODUCTION	2
1.1 PROJECT DESCRIPTION.....	2
1.2 PURPOSE	2
1.3 PROJECT HISTORY	4
1.4 DEBIT LEDGER	5
2.0 HYDROLOGY	6
2.1 SUCCESS CRITERIA.....	6
2.2 HYDROLOGIC DESCRIPTION	6
2.3 RESULTS OF HYDROLOGIC MONITORING	6
2.3.1 Site Data	6
2.3.2 Climatic Data.....	8
2.4 CONCLUSIONS	11
3.0 VEGETATION: HUSKANAW MITIGATION SITE	11
3.1 SUCCESS CRITERIA.....	11
3.2 DESCRIPTION OF SPECIES.....	11
3.3 RESULTS OF VEGETATION MONITORING	12
3.4 CONCLUSIONS	13
4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS	13

LIST OF FIGURES

Figure 1.	Site Location Map	3
Figure 2.	Huskanaw Swamp Site Gauge Location Map.....	7
Figure 3.	Huskanaw Swamp Site 2003 Hydrologic Monitoring Results.....	9
Figure 4.	Huskanaw Swamp 30-70 Percentile Graph, Williamston, NC	10

LIST OF TABLES

Table 1.	Huskanaw Swamp Mitigation Site Debit Ledger	5
Table 2.	2003 Hydrologic Monitoring Results	8
Table 3.	Hydrologic Monitoring Results	8
Table 4.	Vegetation Monitoring Statistics, By Zone and Plot	12

APPENDICES

APPENDIX A	GAUGE DATA GRAPHS
APPENDIX B	SITE PHOTOS (2003)

SUMMARY

The following report summarizes the monitoring activities at the Huskanaw Swamp Mitigation Site. This site was constructed in 1996 to provide wetland mitigation for the relocation of US 64. The site is monitored using three hydrologic monitoring gauges and eight vegetation plots. The 2003-year represents the sixth complete year that monitoring has taken place on the site.

During the 2003 monitoring season, all three of the monitoring gauges showed saturation for more than 12.5% of the growing season, with HS-1, HS-3, HS-4 showing saturation for 27.9%, 20.5%, and 23.4% of the growing season, respectively. This is the sixth consecutive year that all of the groundwater gauges have met the minimum hydrologic success criteria.

The vegetation plots yielded an average plot density of 589 trees per acre, which exceeds the required 260 trees per acre. This is the sixth consecutive year that the average plot density has exceeded the minimum criteria for success. NCDOT proposes to discontinue vegetation monitoring.

The daily rainfall data depicted on the monitoring gauge graphs is recorded from an onsite rain gauge that was installed on May 23, 2000. Historical rainfall data used for the 30-70 percentile evaluation was recorded at the Williamston weather station rain gauge, maintained by the NC State Climate Office. All three monitoring gauges showed saturation for more than 12.5% of the growing season during months of normal rainfall in 2003.

Based on the hydrologic and vegetation success observed over the past six years, the NCDOT submits that this site has met its design objective to restore both wet hardwood forest and swamp forest wetland communities. The NCDOT recommends that all monitoring activities be discontinued on the Huskanaw Swamp Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

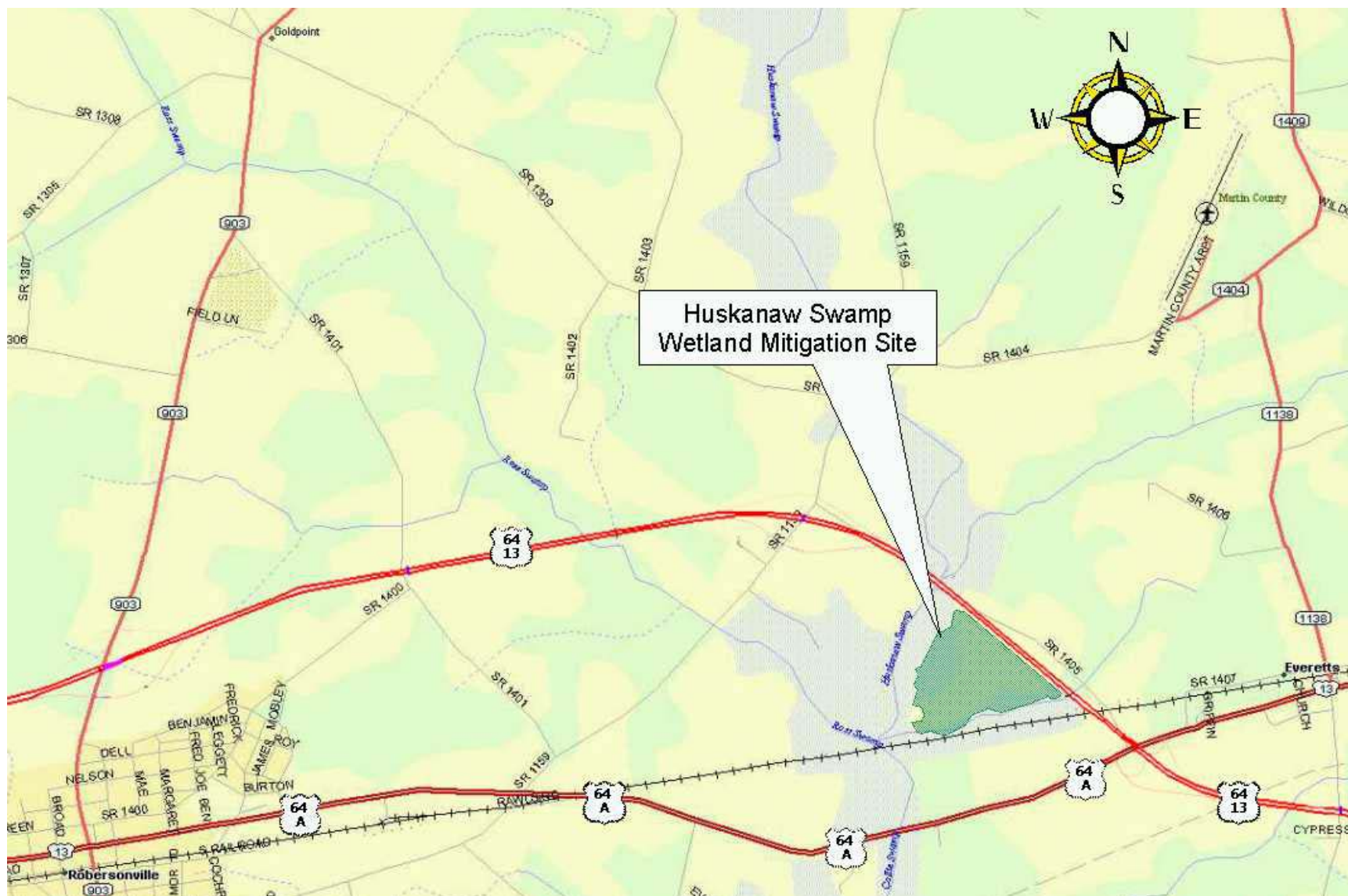
The Huskanaw Swamp Mitigation Site is located in north central Martin County and encompasses approximately 112 acres. It is approximately 0.95 miles west of the US 64 - US 64 Business Interchange, along SR 1405 (Figure 1). The site was originally constructed in the winter of 1996-97. However, planting activities were not completed until February 1998.

The site serves as mitigation for the US 64 relocation and consists of restoration, enhancement, and preservation. The site is designed to restore both wet hardwood forest and swamp forest wetland communities. An additional area preserves approximately 33 acres of swamp/bottomland forest wetlands.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of three years. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetation monitoring during the 2003 growing season at the Huskanaw Swamp Mitigation Site. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season and site photographs.

Figure 1. Site Location Map



1.3 Project History

Winter 1996-97	Site Constructed
April 1997	Monitoring Gauges Installed
April- November 1997	Hydrologic Monitoring
February 1998	Site Planted
March- November 1998	Hydrologic Monitoring (1 yr.)
October 1998	Vegetation Monitoring (1 yr.)
March- November 1999	Hydrologic Monitoring (2 yr.)
October 1999	Vegetation Monitoring (2 yr.)
March- November 2000	Hydrologic Monitoring (3 yr.)
September 2000	Vegetation Monitoring (3 yr.)
May 2001	Onsite Agency Meeting
March- November 2001	Hydrologic Monitoring (4 yr.)
July 2001	Vegetation Monitoring (4 yr.)
March- November 2002	Hydrologic Monitoring (5 yr.)
June 2002	Vegetation Monitoring (5 yr.)
March- November 2003	Hydrologic Monitoring (6 yr.)
July 2003	Vegetation Monitoring (6 yr.)

1.4 Debit Ledger

Table 1. Huskanaw Swamp Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			Ratios	TIP Debit				
	Acres at Start	Acres Remaining	Percent Remaining		R-2112B	R-2112 Bmod	R-2112 BA&BBmod	R-218A	R-218B
BLH Restoration	3.00	0.00	0.00	--		3.00			
SPH Restoration	1.00	0.00	0.00	--					1.00
BLH Enhancement	50.00	23.60	47.20	3.5:1		9.07	4.01	12.32	1.00
SPH Preservation	33.00	0.00	0.00	--	33.00				
Upland Management	33.00	N/A	--	--					
Total	120.00	23.60	27.13						

SPH: Swamp Hardwood

BLH: Bottomland Hardwood

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation and the wetland mitigation plan (entitled “North Carolina Department of Transportation (NCDOT) US 64 Wetland Restoration and Conservation Management Plan, Edgecombe and Martin Counties”, dated October 1994) the success criteria for hydrology states that the area must be inundated or saturated (within 12” of the surface) by surface or groundwater for at least a consecutive 12.5% of the growing season. This success criterion was agreed upon as part of the special conditions set forth by the Corps of Engineers (COE) through their issuance of permits for NCDOT’s TIP projects R-2112 and R-218A & B (Action ID Numbers 199400663 and 199501132). Also included in the success criteria is the following: Areas saturated less than 5% of the growing season are always classified as non-wetlands, while zones saturated between 5% - 12.5% of the growing season can be classified as wetlands based on factors such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Martin County begins March 16 and ends November 14. The dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 16 and before November 14.¹ The growing season is 244 days; therefore, the minimum duration to have wetland hydrology is 31 consecutive days (12.5% of the growing season).

2.2 Hydrologic Description

Three monitoring gauges were installed onsite in April of 1997 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth. Rainfall is the primary hydrologic input for the Huskanaw Site. The 2003 data represents the sixth full growing season for hydrologic monitoring.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 244-day growing season (March 16 – November 14). It is this data that determines the hydrologic success of the mitigation site.

¹ Soil Conservation Service, Soil Survey of Martin County, North Carolina, p.75.

Figure 2. Huskanaw Swamp Site Gauge Location Map

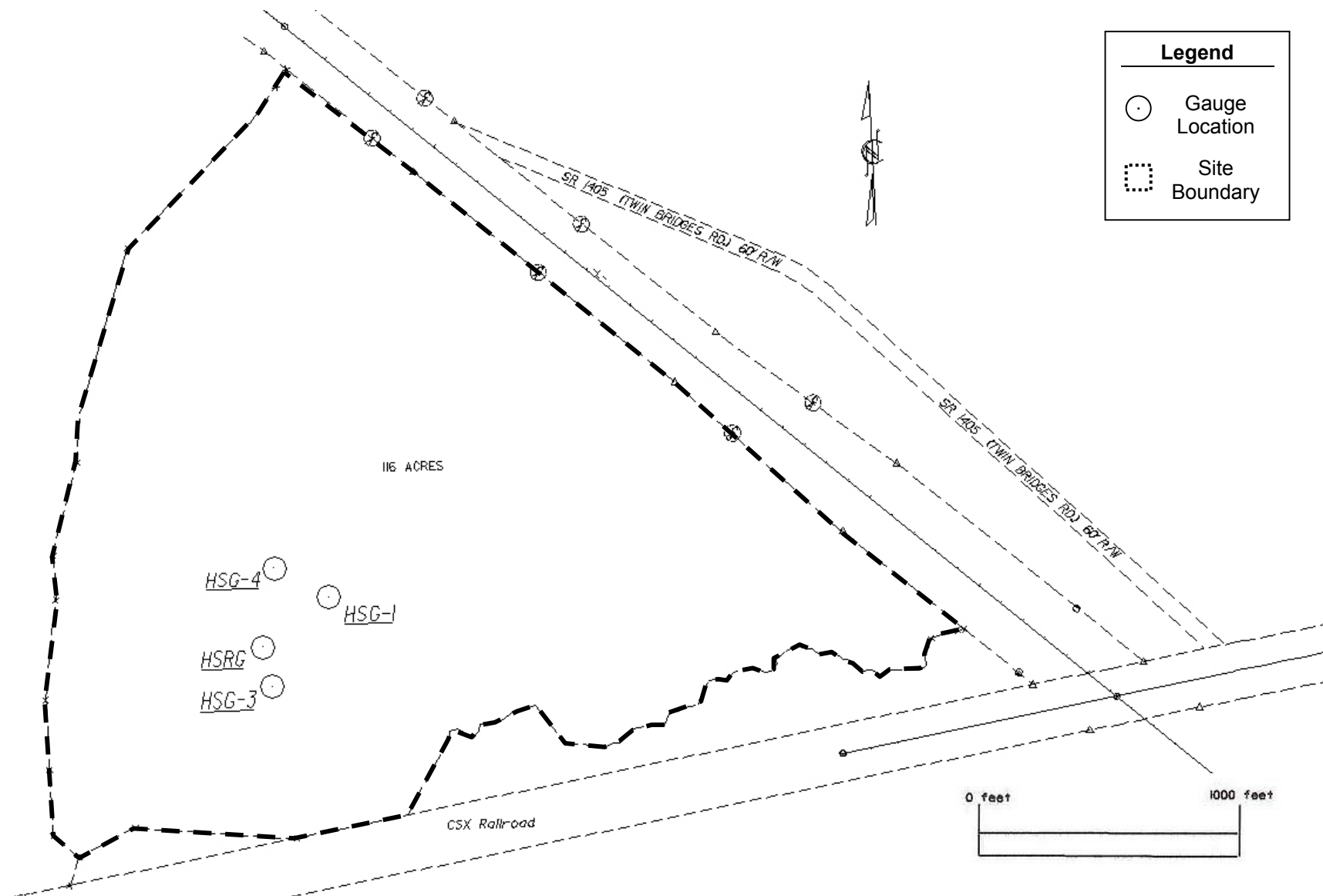


Table 2. 2003 Hydrologic Monitoring Results (also refer to Figure 3)

Monitoring Gauge	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Number Consecutive Days	Actual %	Success Dates
HS-1*				×	68	27.9	March 16-May12 July 30-Oct 5
HS-3*				×	50	20.5	March 16-May 4
HS-4*				×	57	23.4	March 16-May 11

* Gauge met the success criterion during an average rainfall month (March, July, October, and November).

Table 3. Hydrologic Monitoring Results (1997- 2002)

Monitoring Gauge	1997 % Results	1998 % Results	1999 % Results Pre-Hurricane	1999 % Results Post-Hurricane	2000 % Results	2001 % Results	2002 % Results
HS-1	6.2	19.8	13.1	16.4	21.7	16.0	25.4
HS-3	2.1	8.3	9.4	13.5	11.5	13.1	15.6
HS-4	2.9	11.2	9.8	13.5	9.4	13.1	15.2
Climate Conditions	Average to Below Average Rainfall	Average Rainfall	Average to Below Average Rainfall	Average to Below Average Rainfall	Average Rainfall	Below Average Rainfall	Average to Below Average Rainfall

Table 3 represents hydrologic data in percentages from previous years (1997-2002).

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2002 through November 2003 to historical precipitation (collected between 1972 and 2003) for Williamston, North Carolina. This comparison gives an indication of how 2003 relates to historical data in terms of climate conditions. The NC State Climate Office provided all of the offsite data.

For the 2003-year, November (02'), December (02'), February, April, May, August, and September experienced above average rainfall. The months of January and June recorded below average rainfall for the site. March, July, October, and November experienced average rainfall. Overall, 2003 experienced an average to above average rainfall year.

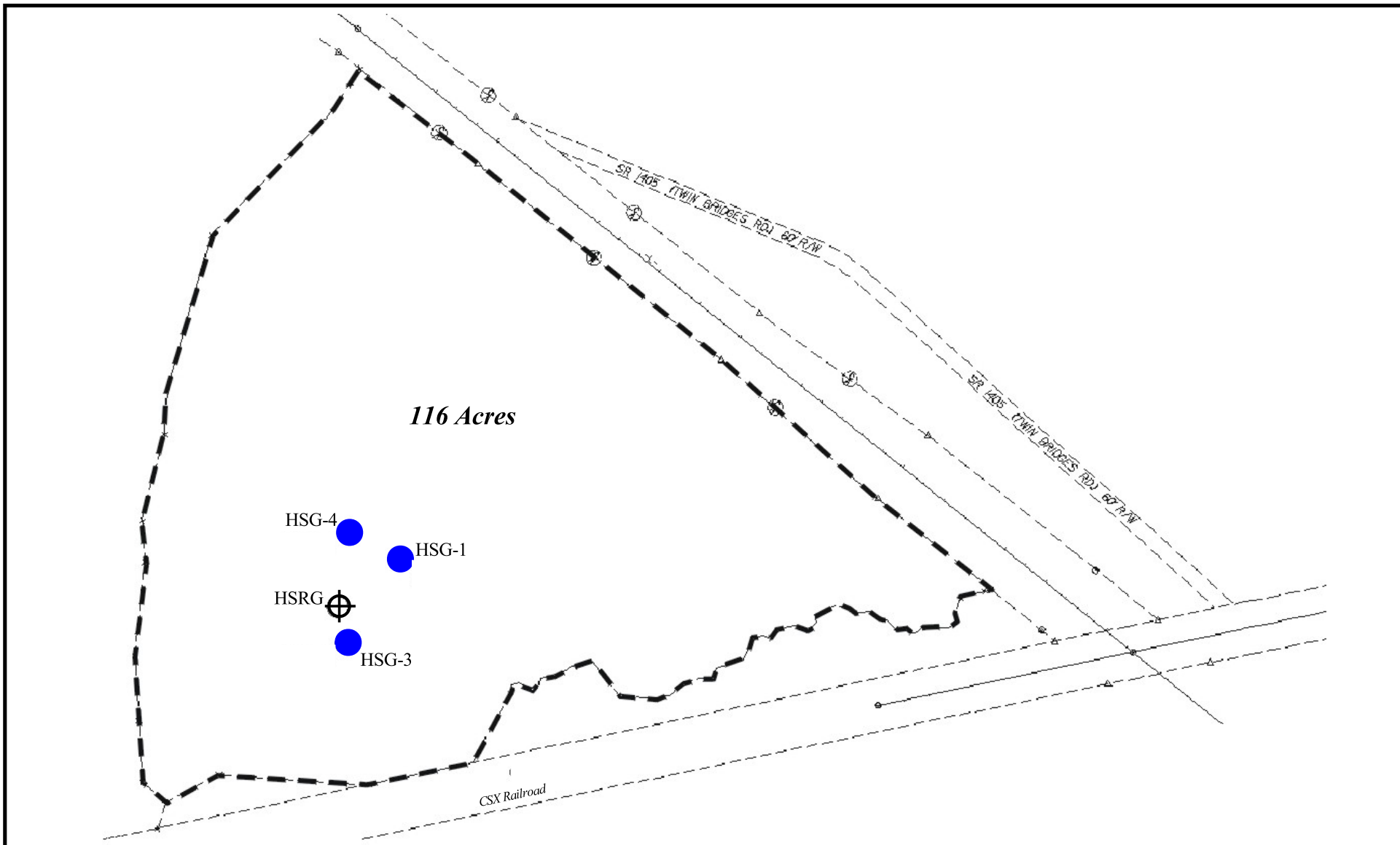


Figure 3. 2003 Hydrologic Monitoring Gauge Results

Hydrology Results

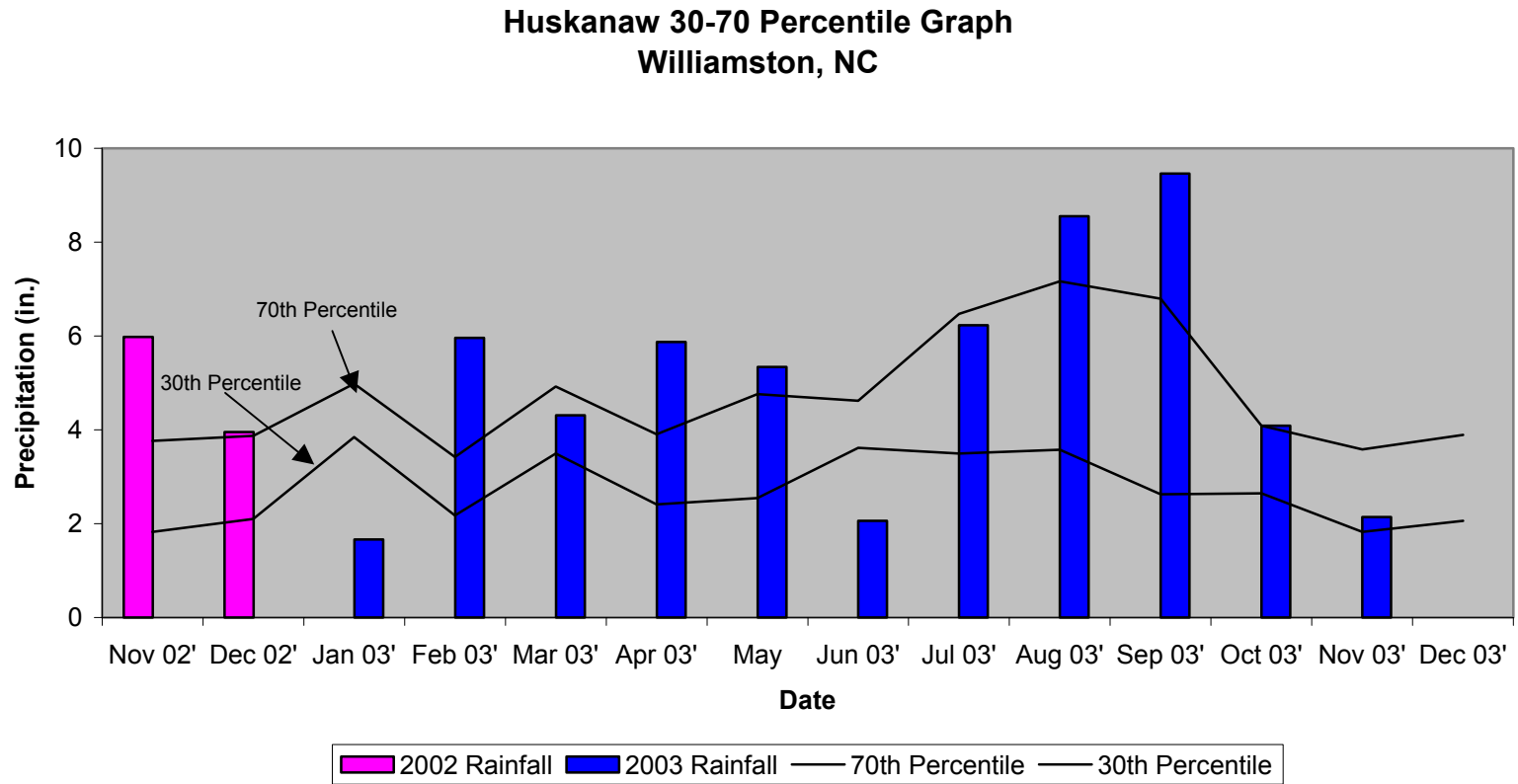
- < 5%
- 5 - 8%
- 8 - 12.5%
- > 12.5%

- ⊕ Rain Gauge
- Surface Gauge



Not to Scale

Figure 4. 30-70 Percentile Graph



2.4 Conclusions

In 2003, all of the monitoring gauges recorded saturation within twelve inches of the surface for at least 12.5% of the growing season. Gauges HS-1, HS-3, and HS-4 recorded saturation at 27.9%, 20.5%, and 23.4% of the growing season, respectively. Therefore, all of the gauges met the 12.5% minimum hydrology criteria during months with normal rainfall in 2003.

NCDOT proposes to discontinue hydrologic monitoring at the Huskanaw Swamp Mitigation Site.

3.0 VEGETATION: HUSKANAW MITIGATION SITE (YEAR 6 MONITORING)

3.1 Success Criteria

Success criteria state that there must be a minimum of 320 trees per acre living for at least three consecutive years.

3.2 Description of Species

The following tree species were planted on the site:

Zone 1: Wet Hardwood Forest (56.6 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Quercus falcata var. *pagodaefolia*, Cherrybark Oak
Quercus michauxii, Swamp Chestnut Oak
Quercus phellos, Willow Oak
Quercus falcata var. *falcata*, Southern Red Oak
Quercus nigra, Water Oak
Nyssa aquatica, Water Tupelo

Zone 2: Oak/Hickory Forest (19.2 acres)

Quercus alba, White Oak
Quercus nigra, Water Oak
Quercus falcata var. *falcata*, Southern Red Oak
Carya tomentosa, Mockernut Hickory
Carya glabra var. *glabra*, Pignut Hickory
Quercus stellata, Post Oak
Quercus falcata var. *pagodaefolia*, Cherrybark Oak
Quercus phellos, Willow Oak
Quercus michauxii, Swamp Chestnut Oak
Carya cordiformis, Bitternut Hickory

Zone 3: Long Leaf-Oak/Hickory Forest (11.1 acres)

Pinus palustris, Longleaf Pine

Quercus marilandica, Blackjack Oak
Quercus phellos, Willow Oak
Quercus stellata, Post Oak
Carya tomentosa, Mockernut Hickory
Carya glabra var. *glabra*, Pignut Hickory
Quercus michauxii, Swamp Chestnut Oak
Quercus alba, White Oak
Quercus nigra, Water Oak
Quercus falcata var. *falcata*, Southern Red Oak
Carya cordiformis, Bitternut Hickory

3.3 Results of Vegetation Monitoring

Table 4. Vegetation Monitoring Statistics

ZONE	Plot #	Green Ash	Cherrybark Oak	Swp. Chestnut Oak	Willow Oak	Water Oak	Post Oak	Mockernut Hickory	Bitternut Hickory	Southern Red Oak	Water Tupelo	Blackjack Oak	Longleaf Pine	Laurel Oak	White Oak	Pignut Hickory	Total (6 year)	Total (at planting)	Density (Trees/Acre)
1	1	5	1	1	6	3					1			1			18	18	680
	3		1	5		2					3						11	21	356
	5	1			3	1				2	6						13	18	491
	6	7	16	7	4	1				1							36	42	583
	8	20	6	4	8	1				3							42	42	680
ZONE 1 AVERAGE DENSITY																			558
2	4		3	4	6			8	3	1					4		29	34	580
	7		6				7	7	13	6					1		40	40	680
ZONE 2 AVERAGE DENSITY																			630
3	2				12		1	2	4	4		10	2				35	36	661
ZONE 3 AVERAGE DENSITY																			661
TOTAL AVERAGE DENSITY																			589

Site Notes:

Zone 1: Other species noted: broomsedge, *Juncus* sp., blackberry, grapevine, fennel, winged sumac, red maple, sweetgum, tulip poplar, holly, various grasses, trumpet creeper, pine, ragweed, horse-nettle, cottonwood, baldcypress, sycamore, ironwood, black willow, buttonbush, and giant cane.

Zone 2: Other species noted: broomsedge, sicklepod, bermuda grass, fennel, ragweed, red maple, and sweetgum. White oak noted in plots 4 and 7.

Zone 3: Other species noted: broomsedge, ragweed, fennel, poplar, *Aster* sp., and Bermuda grass.

3.4 Conclusions

A total of 87 acres involved tree planting on this site. The 2003 vegetation monitoring of the planted areas revealed an average density of 589 trees per acre. This average is well above the minimum requirement of 320 trees per acre.

NCDOT proposes to discontinue vegetation monitoring at the Huskanaw Swamp Mitigation Site.

4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

All three monitoring gauges indicated saturation (in the upper 12" of the soil profile) for more than 20% of the growing season. This is the sixth consecutive year that all of the groundwater gauges have met the minimal hydrologic success criteria, as stated in the associated permits. For the 2003-year, vegetation monitoring yielded an average plot density of 589 trees per acre.

Based on the hydrologic and vegetation success observed over the past six years, NCDOT proposes to discontinue monitoring of the Huskanaw Mitigation Site.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

HUSKANAW



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5

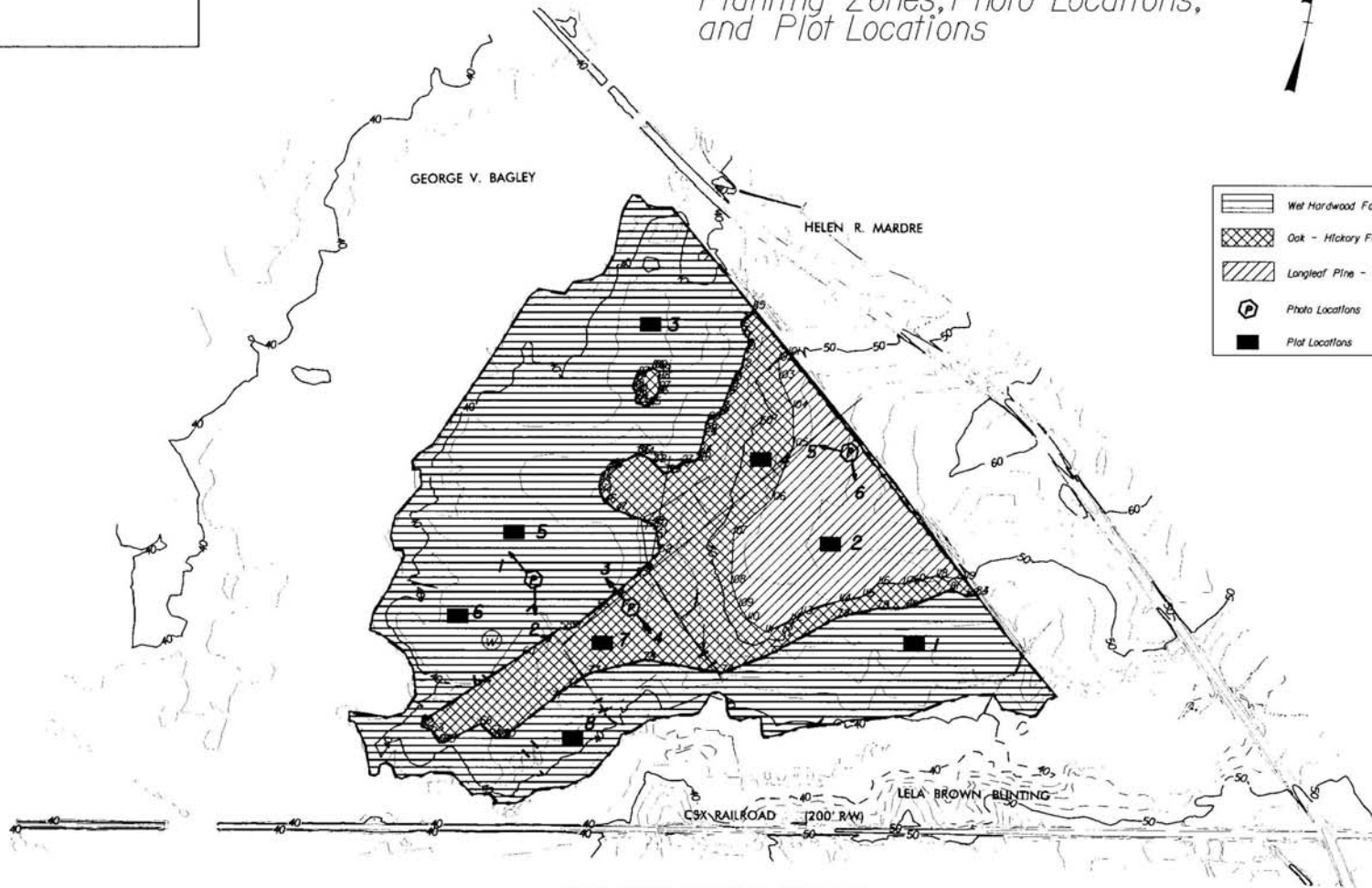


Photo 6

2003

Huskanaw Wetland Mitigation Site Planting Zones, Photo Locations, and Plot Locations

PROJECT REFERENCE NO.	SHEET NO.
R-2112MM	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



	Wet Hardwood Forest
	Oak - Hickory Forest
	Longleaf Pine - Oak - Hickory Forest
	Photo Locations
	Plot Locations

DETAIL SHOWING LOCATION OF DITCH PLUGS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION